Quality Assurance Project Plan

Avery Landing Site
Avery, Idaho

for
U.S. Environmental Protection Agency on Behalf of Potlatch Land and Lumber, LLC

April 12, 2013

GeoEngineers

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Avery Landing Site
Avery, Idaho

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GeoEngineers

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1.0 INTRODUCTION

This document presents the Quality Assurance Project Plan (QAPP) for the environmental sampling activities to be completed as part of the Avery Landing Site (Site) removal action. The Site is located approximately one mile west of Avery, Idaho. This QAPP is to be used in conjunction with the Site Specific Sampling Plan (SSSP) which is presented in Attachment B of the Avery Landing Removal Action Work Plan (Work Plan; GeoEngineers, 2013). The information contained in this QAPP is based on information available at the time of preparation. This QAPP may be updated as additional information becomes available.

The QAPP and associated SSSP were prepared in general accordance with the requirements of 40 CFR 300.415(b)(4)(ii), EPA's Requirements for Quality Assurance Project Plans (EPA, 2001) and EPA's Guidance for Quality Assurance Project Plans (EPA, 2002).

2.0 PROJECT MANAGEMENT AND ORGANIZATION

The project management and organization elements of the QAPP as detailed below address the basic area of project management including the roles and responsibilities of the participants, the project description, quality objectives and criteria, special training/certification and documents and records.

2.1. Project Organization and Responsibilities

Key individuals and positions providing quality assurance (QA) and quality control (QC) are summarized in the following table. A description of the responsibilities, lines of authority and communication for the key individuals and positions providing QA and QC is presented in Sections 2.1.1 through 2.1.8. This element of the plan ensures that the each key project participant has a defined role.

Project Role	**Name** **Organization**	**Telephone** **Email** **Address**
Regulatory Project Manager/ On-Scene Coordinator	Earl Liverman EPA	208.664.4858 Liverman.earl@epamail.epa.gov Coeur d'Alene Field Office 1910 Northwest Boulevard, Suite 208 Coeur d'Alene, Idaho 83814
Potlatch Project Manager	Terrance Cundy Potlatch	208-301-0410 Terry.Cundy@potlatchcorp.com 530 S. Asbury, Suite 4 Moscow, Idaho 83843
Technical Project Manager	John Herzog GeoEngineers	206.406.6431 jherzog@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101

Project Role	Name Organization	Telephone Email Address
Task Manager/Field Coordinator	Robert Trahan GeoEngineers	206.239.3253 rtrahan@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101
Health and Safety Manger	Wayne Adams GeoEngineers	206.239.3253 wadams@geoengineers.com 1101 Fawcett Avenue, Suite 200 Tacoma, Washington 98402
Quality Assurance Leader	Mark Lybeer GeoEngineers	206.278.2674 mlybeer@geoengineers.com 600 Stewart Street, Suite 1700 Seattle, Washington 98101
Laboratory Project Manager	Randee Decker Test America	509.924.9200 randee.decker@testamericainc.com 11922 E 1st Avenue Spokane, WA 99206

Commented [EL1]: Tables C-2 and C-3 indicate that MDL values are from ARI. Clarify which laboratory (ARI or Test America) will be used.

Commented [PL2]: Values are now referenced to Test America.

2.1.1. Regulatory Project Manager and Federal On-Scene Coordinator

The Regulatory Project Manager is responsible for overseeing the implementation of the work to be performed under the Administrative Settlement Agreement and Order on Consent. The Regulatory Project Manager will review and approve the QAPP and subsequent revisions and amendments.

2.1.2. Potlatch Project Manager

The Potlatch Project Manager's duties consist of implementing the project approach and tasks, overseeing the project team members during performance of project tasks.

2.1.3. Technical Project Manager

The Technical Project Manager is responsible for fulfilling contractual and administrative control of the project. The Technical Project Manager's duties include defining the project approach and tasks, selecting project team members and establishing budgets and schedules.

The Technical Project Manager's duties also include implementing the project approach and tasks, overseeing project team members during performance of project tasks, adhering to and communicating the status of budgets and schedules to the Potlatch Project Manager, providing technical oversight, and providing overall production and review of project deliverables. The Technical Project Manager shall maintain the official, approved SSSP/QAPP and shall be responsible for distributing updated documents to the recipients listed in Section 2.1.

2.1.4. Task Manager

The individual task managers are responsible for the daily management of project tasks including providing technical direction to the field staff, produces task specific documents including the ~~Quality Assurance Project Plan (~~QAPP~~)~~, ~~Site Specific Sampling Plan (~~SSSP~~)~~, and Health and Safety Plan (HASP), develops schedules and allocates resources for field tasks, coordinates data collection activities to be consistent with information requirements, supervises the compilation of field data and laboratory analytical results, assures that data are correctly and completely reported, implements and oversees field sampling in accordance with project plan and supervises field personnel. Additionally, the Task Manger coordinates work with on-site subcontractors, verifies that appropriate sampling, testing, and measurement procedures are followed, coordinates the transfer of field data, sample tracking forms, and log books to the Project Manager for data reduction and validation, and participates in QA corrective actions as required.

2.1.5. Field Coordinator

The Field Coordinator will lead the field sampling effort for the project, serving as the direct point of contact between the Task Manager, analytical laboratory, and subcontractors and ensures that the appropriate sampling containers, chain-of-custody (COC) forms and field sampling gear including personal protective equipment (PPE) are available. The Field Coordinator is to ensure that data collection activities are consistent with information requirements and to assure that field information is correctly and completely reported for the entire duration of the project. The Field Coordinator will also coordinate appropriate sampling, testing, and measurement procedures and schedule sample delivery/shipment with the analytical laboratory. The Field Coordinator will transfer field data and sample tracking forms to the project file and data reduction and validation and participate in QA corrective actions as required.

2.1.6. Technical/Field Staff

Technical/Field Staff have the primary responsibility for duties involve field data collection and documentation. Technical/Field Staff are responsible for:

- Understanding and following the QAPP and SSSP.
- Checking all equipment and supplies in advance of field operations.
- Ensuring that samples are properly collected, preserved, labeled, packaged, and shipped.
- Ensuring that all field data are carefully recorded and preserved according to the QAPP and SSSP.
- Following chain-of-custody procedures and standard operating procedures when they are required.

2.1.7. Quality Assurance Leader

The Quality Assurance Leader will provide oversight required for the completion of sample analyses for the project and verify, in conjunction with the laboratory manager, that the analytical work is proceeding in accordance with internal laboratory standard practices and the QA/QC guidelines for the project. This person will also oversee completion of data validation activities completed for this project. The Quality Assurance Leader maintains independence from the individual(s) generating the data.

2.1.8. Health and Safety Manager

The Health and Safety Manager will oversee implementation of health and safety programs and verify that work on the project proceeds in accordance with the site-specific HASP.

2.1.9. Laboratory Project Manager

The Laboratory Project Manager will fulfill the analytical requirements of this project including being responsible for sample analyses using appropriate analytical laboratory methods. The specific procedures to be used for COC transfer, internal calibrations, laboratory analyses, reporting, preventive instrument maintenance, and corrective action will follow standard protocols.

2.2. Problem Definition and Background

Detailed information regarding historical operations, previous environmental investigations, regulatory history and previous cleanup actions are presented in the Engineering Evaluation/Cost Analysis (EE/CA) Work Plan prepared by Golder and Associates (Golder, 2009) for Potlatch, Draft Final EE/CA report prepared by Ecology and Environment for EPA (E&E, 2010), and Supplemental Investigation Report (GeoEngineers, 2011). Site history, results of previous investigations and current conditions are summarized below.

2.2.1. Background Information

Detailed information regarding Site and operational history, previous investigations and regulatory history and cleanup actions are presented in EPA's EE/CA (E&E, 2010) and/or Potlatch's Supplemental Investigation Report (GeoEngineers, 2011) and ~~are~~is summarized in the Work Plan.

2.2.2. Problem Statement

~~Based on the results of previous environmental investigations, contaminants have been identified in the soil, groundwater and in sediments adjacent to the Site. As a result of the continued presence of petroleum seeps and sheen in the St. Joe River, the Site is subject to cleanup.~~ Pursuant to the Action Memorandum for the Avery Landing Site (EPA, 2011), and agreements with EPA, Potlatch will perform removal actions followed by post-removal action groundwater monitoring to monitor natural attenuation of ~~Site~~ contaminants identified by previous environmental investigations of soil, groundwater and river sediment at the Site.

Commented [EL3]: This statement is incorrect. The Site is subject to cleanup because it is contaminated with CERCLA hazardous substances and oil and there are ongoing releases of these materials to the adjacent St. Joe River.

Commented [PL4]: Revised text.

2.3. Project and Task Description

2.3.1. Project Description

In accordance with the EE/CA (E&E, 2010) the selected removal action involves the excavation and removal of subsurface soil contaminated with petroleum hydrocarbons (diesel and heavy oil). Removal of this material is expected to significantly reduce or eliminate the source and prevent the continued discharge of petroleum hydrocarbons and hazardous substances into the St. Joe River. Residual contamination remaining at the Site will attenuate by way of natural processes over-time and the progress of these processes will be monitored.

During the summer/fall of 2012, EPA performed cleanup activities on the parts of the Site owned by Larry and Ethel Bentcik (Bentcik), the United States administered by the Federal Highway Administration (FHWA), the Idaho Department of Lands (IDL), and Potlatch to remove contaminated materials from the Site. Contaminated materials were excavated from property owned by Potlatch to address a portion of the St. Joe River shoreline where petroleum discharges were historically observed and to install stable side slope transitions between the Bentcik property and the FHWA property excavation areas and the Potlatch property.

Additional excavation activities will be performed by Potlatch in the summer/fall of 2013 to remove residual contamination remaining at the Site. The objectives of the removal action are to:

- Remove the remaining components of the product containment, collection, and extraction systems that were installed as part of the 1994 and 2000 removal actions;
- Remove soil exceeding field screening methods within the upland and river bank areas;
- Remove, treat, and/or manage petroleum product that is present as light Non-Aqueous Phase Liquids (LNAPL) on groundwater within the excavations;
- Dispose of waste streams in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) off-site rule requirements; and
- Restore portions of the Site affected by the removal action including river bank reconstruction, backfilling, compaction, grading and re-vegetation.

The design and approach for the removal action that will be performed by Potlatch are presented in the Work Plan.

2.3.2. Task Description

Sampling activities that will be conducted during the removal action will include collecting soil, treated water, and post-removal action groundwater samples for chemical analysis at a contract laboratory. In addition, field screening of soil will be conducted to evaluate the presence of petroleum contamination during excavation, surface water monitoring will be conducted at locations upstream and downstream to evaluate potential impacts to the St. Joe River resulting from the removal action, and air monitoring for particulate matter will be conducted at locations upwind and downwind using field instruments to determine if Site activities are generating particulate concentrations that exceed applicable regulatory standards at the project boundary.

Specific details of the sampling activities that will be conducted during the removal action are presented in the SSSP (Appendix B of the Work Plan).

2.3.3. Project Schedule

Removal action activities being performed by Potlatch will be completed summer/fall of 2013. Post-removal action groundwater monitoring will be performed following completion of the removal action as approved by EPA. A schedule for mobilization/demobilization, sampling activities, and reporting are presented in the Work Plan.

2.4. Quality Objectives and Criteria

2.4.1. Project Quality Objectives

Data quality objectives for sampling activities that will be performed for the removal action are presented in the SSSP (Appendix B of the Work Plan). The SSSP provides information about specific analytes, measurement objectives, method requirements and data uses for the removal action.

2.4.2. Chemical Data Quality Objectives

The quality assurance objectives for technical data are to collect environmental monitoring data of known, acceptable, and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness, and comparability, and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures, and QC procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include quantitative factors (bias, sensitivity, precision, accuracy, and completeness) and qualitative factors (representativeness and comparability). The measurement quality objectives (MQO) associated with these data quality factors are summarized in Table C-1 and are discussed below.

2.4.2.1. SENSITIVITY

The primary measurement quality objective for this project is to analyze for chemicals at Practical Quantitation Limits (PQLs) less than target reporting limits (TRLs). These limits are provided in Tables C-2 and C-3. In order to meet these TRLs, the laboratory will report the analyte concentrations detected at or above the Method detection Limits (MDLs) but less than Method Reporting Limits (MRL) as “estimated.”

2.4.2.2. ACCURACY AND BIAS

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike and standard. Analytical accuracy is measured by comparing the percent recovery of analytes or surrogates spiked into a sample or QC sample [matrix spike (MS), matrix spike duplicate (MSD) or laboratory control sample (LCS)] to the control limits listed in Table C-1. Accuracy is calculated using the following formula:

$$\%R = \frac{100(xs - xu)}{K}$$

Where: *%R* = percent recovery of spike (also known as matrix spike recovery [MSR]).

xs = measured value for spiked sample.

xu = measured value for unspiked sample.

K = known value of the spike in the sample.

Bias is a systemic or persistent distortion of a measurement process that causes errors in one direction. It usually is associated with the idea of obtaining data that will lead to a consistently "low" or consistently "high" concentration of a given target analyte.

2.4.2.3. PRECISION

Precision measures the reproducibility of the measurements calculated using the data generated in the analysis of laboratory duplicate samples. Each duplicate analysis will be recorded on the appropriate form, and the equations used to calculate the precision of data should be included. If the difference of the value between two duplicate samples exceeds the MQOs (Table C-1), then the precision should be judged to be out of control and the analyst should be instructed to confirm the source of the precision error. Once confirmed and remedied, the analysis will be rerun providing acceptable precision limits, and the data can then be reported.

Precision is measured using the relative percent difference (RPD) from pairs of duplicate measurements, calculated as follows:

$$\%RPD = \frac{100(d1 - d2)}{\left[\frac{d1 - d2}{2}\right]}$$

Where: *%RPD* = percent relative difference.

d1 and *d2* = the concentrations of the two measurements.

RPD can be calculated using duplicate analyses in the case where an analyte is detected. If an analyte is not detected, the RPD can be calculated from the percent recoveries of the matrix spike (MS) and matrix spike duplicate (MSD) analyses.

2.4.2.4. COMPLETENESS

Completeness is calculated for the aggregation of data for each analyte measured for any particular sampling event or other defined set of samples. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not rejected through data validation. For this project, the requirement for completeness is 90 percent (%).

The following equation is used to calculate completeness:

$$\% \, completeness = \frac{number \ of \ valid \ results \ \times 100}{number \ of \ possible \ results}$$

For instances when samples could not be analyzed (i.e., because of holding time violations for which re-sampling and analysis were not possible, samples that were spilled or broken, etc.), the numerator of this equation becomes the number of valid results minus the number of possible results not reported.

2.4.2.5. COMPARABILITY

Comparability is the qualitative term that expresses the measure of confidence that two data sets or batches can contribute to a common analysis and evaluation. Comparability with respect to laboratory analyses pertains to method type comparison, holding times, stability issues, and aspects of overall analytical quantitation. The following items are evaluated when assessing data comparability:

- Whether two data sets or batches contain the same set of parameters.
- Whether the units used for each data set are convertible to a common scale.
- Whether similar analytical procedures and quality assurance were used to collect data for both data sets.
- Whether the analytical instruments used for both data sets have approximately similar detection levels.
- Whether samples within data sets were selected and collected in a similar manner.

To ensure data comparability, standard sample collection and analytical methods/procedures will be used for this project.

2.4.2.6. REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, a process condition, an environmental condition, or parameter variations at a sampling point.

Representativeness is assessed by way of evaluating issues such as (but not limited to) sampling methods, analytical methods used, holding times, laboratory blanks, field blanks, COC records, detection limits, and sample dilutions. The field QA/QC procedures for sample handling, including COC records, will provide for sample integrity until the time of analysis. To make certain that the analytical results of this assessment are representative of the true field conditions, appropriate laboratory QA/QC procedures (as indicated in this QAPP) should be followed.

The degree to which the data are representative of the field conditions will be evaluated during the Quality Assurance Leader's review of the analytical data. The results of the validation review will be summarized in the Data Validation Report.

2.5. Special Training/Certifications

The Field Coordinator and field staff will be up-to-date on their Hazardous Waste Operations and Emergency Response (HAZWOPER) training and will be certified in cardiopulmonary resuscitation

(CPR) and first aid. This training is provided via online and in-class annual or biennial training. All field staff will be knowledgeable in and understand the proper technical protocols for collecting soil samples for all analytes including petroleum hydrocarbons, VOCs, SVOCs, PCBs and metals.

Records documenting HAZWOPER and CPR/First Aid certifications are documented in the Site Health and Safety Plan (HASP) presented in Appendix D of the Work Plan and are also kept by the Health and Safety Manager.

2.6. Documentation and Records

The approved final SSSP/QAPP will be maintained in electronic format by the Project Manager, in Microsoft Word© format and in an Adobe portable document format (PDF). One hard copy of the SSSP/QAPP will be utilized by field staff to ensure consistency with protocols.

The following documents will be produced during the removal action construction:

- Daily field report that documents field sampling activities will be performed by the field staff and maintained in both electronic and hard copy formats. The field report will include information on field forms or in the field notebook including daily activities, field screening results, samples collected, and surface water quality and air particulate monitoring results. Other information included in the field report is listed in Section 3.4.

Records will be retained by GeoEngineers, Inc. in hard copy and in electronic Microsoft Word and/or PDF format for at least 10 years. Electronic data is backed up daily in-office and also sent to a centralized data center for off-site storage.

Individuals identified in Section 2.1 will receive updated versions of the SSSP/QAPP electronically (via email with attached PDF). The Technical Project Manager will distribute the updated documents as they become available.

3.0 DATA GENERATION AND ACQUISITION

The data generation and acquisition elements of the QAPP (as detailed below) address aspects of the project design and implementation including the appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and how QC activities are employed and properly documented.

The information presented herein applies directly to the selection of sampling locations and field sampling methodology. The sample nomenclature, the number of samples to be collected, and the rationale for sampling and choosing the appropriate sample locations are presented in this section of the QAPP. Sampling methods including field documentation, sampling and decontamination procedures, are also discussed below.

3.1. Sample Process Design

Specific details of the sampling activities (i.e., sample locations, frequency, field and laboratory analysis, and rational) that will be conducted during the removal action are presented in the SSSP (Appendix B of the Work Plan).

3.1.1. Soil Excavation

Soil excavation activities will be performed to remove petroleum contaminated soil from the Site. During excavation, visual observation and field screening (discussed in Section 3.2.4) will be used to determine the final excavation extent and for segregating overburden soil from the underlying petroleum contaminated soil.

At the final limits of excavation as determined by EPA, sidewall and base soil samples will be obtained and submitted for chemical analysis at a contract laboratory to identify the baseline concentrations for natural attenuation monitoring. Sidewall samples will be obtained at a frequency of one per 300 linear feet of excavation sidewall. Excavation sidewall samples will be obtained at the approximate vertical midpoint of the observed petroleum-contaminated soil layer. Potlatch will use discretion with respect to collection of sidewall samples from the transitions between the Potlatch and FHWA properties, Potlatch and IDL properties, or Potlatch and Bentcik properties since the sidewall is comprised of clean backfill material placed by EPA. Sidewall samples will be collected from these transitions to confirm any areas suspected to have been re-contaminated as part of the transition area construction. Base samples will be obtained on a grid pattern with grid cells measuring approximately 150 feet (along the plume length) by approximately 100 feet (along the plume width). The location and orientation grid pattern being used for this removal action is based on EPA's 2012 removal action base sampling grid (E&E, 2012).~~Sidewall samples will be obtained at a frequency of one per 300 linear feet of excavation sidewall. Base samples will be obtained on a grid pattern with grid cells measuring approximately 150 feet (along the plume length) by approximately 100 feet (along the plume width).~~

Commented [EL5]: The clean transition area sidewalls need not be sampled. See also SSSP Section 3.1.1.3.

Commented [PL6]: Noted. Samples will be collected to confirm soil quality where recontamination is suspected to have occurred

The approximate locations of base and sidewall samples based on the maximum expected limits of excavation are shown on Figure B-2 of the SSSP (Appendix B of the Work Plan). The actual soil sample locations will be determined based on the final excavation limit.

3.1.2. Excavated Soil

During excavation, visual observation and field screening (discussed in Section 3.2.4) will be used to determine the contact between the petroleum contaminated soil and overlying overburden. Soil in which visual and field screening evidence of petroleum contamination is observed will be exported from the ~~s~~Site and transferred to a permitted landfill. Overburden soil which does not exhibit visual and/or field screening evidence of contamination will be stockpiled on~~-~~Site pending reuse as backfill.

Petroleum contaminated soil generated from the saturated zone will be allowed to drain until a representative sample from the stockpile passes the Paint Filter Liquids Test (PFLT; EPA Method 9095). If requested by the receiving landfill, representative soil samples will be obtained at the frequency determined by the receiving landfill, and submitted to a fixed laboratory for chemical analysis.

3.1.3. Import Fill Material

Representative samples of the source material for imported fill soil will be submitted to a contract laboratory for chemical analysis of petroleum hydrocarbons (TPH), SVOCs, VOCs, and PCBs~~, and~~

~~RCRA metals~~. Additionally, representative samples of the source material will be obtained tested to determine maximum dry density using a modified proctor by ASTM D1557.

3.1.4. Surface Water

Surface water monitoring activities will be conducted at locations upstream, mid-Site and downstream of the removal action area using field instrumentation to determine if Site activities are affecting surface water quality in the river.

3.1.5. Air

Air monitoring for particulate matter will be conducted at locations upwind, mid-Site and downwind using field instrumentation to determine if Site activities are generating particulate concentrations that exceed action levels (presented in Table B-1 of the SSSP) at the project boundary.

3.1.6. Treated Water

Water samples will be obtained from the water treatment system during operation to ensure that water being discharged to the St. Joe River meet the surface water quality criteria for the project (water quality discharge criteria are presented in Table B-2 of the SSSP). Water samples will be analyzed for ~~petroleum hydrocarbons,~~ SVOCs, PCBs and metals.

3.1.7. Groundwater

Following completion of the removal action, monitoring wells will be installed and sampled for ~~petroleum hydrocarbons~~TPH, SVOCs, PCBs and VOCs to monitor groundwater conditions and natural attenuation of Site contaminants. A post-construction monitoring plan will be prepared for approval by EPA following completion of the removal action ~~construction~~.

3.2. Sampling Methods

This section discusses the methodologies that will be used, and the Standard Operating Procedures that will be followed for sample collection, sample nomenclature, sample handling, COC preparation and decontamination.

3.2.1. Soil Sampling Equipment

Excavation limit soil samples will be collected directly from the excavation sidewalls/base using hand tools (i.e., stainless steel spoon) or by use of the excavation equipment (i.e., backhoe or excavator). Samples collected from the excavation equipment will be collected from the approximate middle of the excavator or backhoe bucket (i.e., material that has not come in contact with the bucket) using stainless steel spoons. Stockpile soil samples will be obtained directly from the stockpile using hand tools (i.e., stainless steel spoon). Excavation limit and stockpiles soil samples will be collected at a depth of approximately 2 to 6 inches into the exposed surface and containerized as specified by the testing laboratory with the sample location, date, time, and depth documented.

3.2.2. Water Sampling Equipment

Surface water quality samples will be collected directly from the St. Joe River using a container (i.e., glass jar) or container attached to a pole. Field instrumentation will be used to measure project specific water quality parameters (surface water quality parameters are presented in Table B-1 of the SSSP).

Water treatment system samples will be obtained directly from inline sampling ports or effluent water and containerized.

Groundwater samples obtained following completion of the removal action will be obtained using disposable Teflon bailers and/or using dedicated polyethylene tubing and peristaltic pump. Treatment system and groundwater samples will be placed in a laboratory specified container with the sample location, date, time, and depth documented.

Prior to groundwater sample collection, groundwater levels will be measured in each monitoring well using an electric water level indicator (e-tape) to the nearest 0.01 foot relative to the surveyed casing rim elevations.

3.2.3. Decontamination Procedures

Care will be made to collect samples representative of Site conditions including avoidance of cross-contamination between sample locations during field activities. The following decontamination procedures will be implemented during field activities to avoid cross-contamination:

- Disposable sampling equipment will be used when possible to minimize decontamination requirements. Non-disposable sampling equipment (i.e. stainless steel spoons, bowls, and depth to water meter) will be decontaminated prior to and after use. Decontamination procedures for this equipment will consist of the following:
    1. Washing with a brush and non-phosphate detergent solution (e.g., distilled water and Alconox or Liqui-Nox);
    2. Rinsing in a container of distilled water;
    3. A final rinse by pouring distilled water over the equipment; and
    4. Wrapping the decontaminated equipment in aluminum foil and placing the equipment in a disposable plastic bag for storage.
- Field sampling staff will use nitrile gloves and change them between each sample interval and sample location to prevent cross-contamination.
- Pre-cleaned, QA-tested, and previously unused sample jars provided by the Laboratory will be used to contain samples.
- Sample containers will be labeled immediately before they are used to contain a sample. Samples will be assembled and documented according to appropriate chain of custody (COC) procedures prior to delivering to the Laboratory including custody seals on each cooler in the event that the Field Staff who collected the sample is not the person delivering the containers.

Commented [EL7]: Clarify whether rinse blanks will be collected and analyzed.

Commented [PL8]: Text added to Section 3.10 to present rinsate sampling procedures and frequency for reusable equipment.

3.2.4. Field Screening

Soil generated by the removal action will be screened in the field for the presence of petroleum hydrocarbons to determine whether soil is acceptable for reuse ~~on- Site~~ and to determine the lateral and vertical extent of the removal excavation.

The extent of excavation will be based on field screening methods (i.e., presence of free-phase petroleum hydrocarbons, oil-staining, sheen exceeding field screening criteria, or elevated field measured organic vapor). The procedure for conducting the petroleum sheen test will consist of collecting a representative soil sample and applying water until the soil is saturated and water collects around it.

3.2.4.1. VISUAL SCREENING

The soil will be observed for stains ~~unusual color and/or staining~~ indicative ~~of possible~~ of petroleum-related contamination. For example, dark brown, gray or black staining in the vadose zone may indicate petroleum contamination, but may also be caused by organic material or dark colored minerals present in the soil. Additionally, green, blue-gray or gray staining in soil in the vicinity of the water table may indicate petroleum contamination or may be caused by naturally-occurring bacteria that change soil from oxidizing to reducing conditions.

Commented [EL9]: Describe in better detail as related to petroleum.

Commented [PL10]: See added text.

3.2.4.2. WATER SHEEN SCREENING

Visual classification of the petroleum-related sheen from representative soil samples will be evaluated relative to the following field screening criteria:

- None (no sheen visually detected);
- Sheen (oil film present, but does not display rainbow); and
- Rainbow (definite oil sheen, film, or product that displays rainbow).

A passing test will be defined as soil that does not exhibit rainbow sheen. If rainbow sheen is observed in a sample or any of the other field screening methods indicate the presence of petroleum, additional excavation will be performed ~~as necessary~~ to remove the suspect soil and field screening will be completed to confirm the completeness of the excavated area.

3.2.4.3. HEADSPACE VAPOR SCREENING

This is a semi-quantitative field screening method that can help identify the presence or absence of VOCs in soil samples. A portion of the soil sample will be placed in a resealable plastic bag. The bag will then be sealed to the extent practicable, capturing air in the bag. The bag is then shaken gently to expose the soil to the air trapped in the bag. The probe of a photoionization detector (PID) will then be inserted through a small opening in the bag, taking care not to clog the probe with soil. The maximum PID reading (in parts per million [ppm]) will be recorded on the field log for each sample. The PID will be calibrated to 100 ppm isobutylene in accordance with the manufacturer's recommendations. No soil samples used for headspace screening will be submitted to the laboratory for chemical analysis.

3.3. Analyte-Specific Considerations

For sample containers which may have preservative (e.g. VOCs), caution will be exercised to avoid spilling the preservative.

Commented [EL11]: Note that Table C-4 does not include preservative for VOC water samples,

Commented [PL12]: Table C-4 updated to include HCL preservation for VOC water samples.

Staff will be trained in the correct procedures for collecting soil samples for VOC analysis in accordance with EPA Method 5035 requirements. As described in Section 3.2.1, approximately 2 to 6 inches of soil will be removed before collecting a sample to avoid VOC loss. A disposable soil plunger will be used to collect the required amount of soil. Soil will be placed into a pre-weighed container and sealed tightly to avoid VOC loss.

3.4. Field Documentation

The field staff will be responsible for documenting field sampling activities in an all-weather (e.g. "Rite-in-the-Rain") field notebook and on field logs, and by producing a draft technical field report at the end of each day of sampling. The field staff will also be responsible for implementing field QA/QC procedures in accordance with the methods outlined in this QAPP and general good practice sampling protocols. These procedures include recording and documenting relevant and appropriate information regarding project activities, sampling methods and data collected during performance of field activities at each sample location.

The following general guidelines should be followed in documenting fieldwork:

- Documentation will be maintained in a dedicated field notebook and on field forms.
- Notebook documentation will be completed in water proof ink or permanent marker and written errors will be crossed out with a single line.

Commented [EL13]: Entries should be made in water proof ink or permanent markers.

Commented [PL14]: Text revised.

Field notebooks will include records of pertinent activities related to specific sampling tasks. They will be bound books with sequentially numbered pages. The books will remain in the custody of the Field Coordinator until project completion, after which, the books will be kept in the project files.

The field notebook and forms will be maintained on a real-time basis and will include, where applicable and appropriate, the following information:

- Date, time of specific activities and weather conditions.
- Names of all personnel on the site, including visitors.
- Specific details regarding sampling activities, including sampling locations, type of sampling, depth, and sample numbers.
- Specific problems and resolutions.
- Identification numbers of monitoring instruments used that day.
- Chain-of-custody details, including sample identification numbers.

A draft field report will be prepared upon completion of field sampling activities each day. Field data that was recorded in the notebooks and field forms will be used to complete the field report. The field report will be used to document construction, sampling, and monitoring activities, sampling and Site personnel, and weather conditions, as well as decisions, corrective actions, and/or modifications to the project plans and procedures discussed in this report. The draft field report will be finalized following review by the Field Coordinator and/or Technical Project Manager and kept in the project files.

Commented [EL15]: Describe this daily report in greater detail (e.g., contents, use, etc.).

Commented [PL16]: See additional text.

3.5. Sample Nomenclature

Samples collected by GeoEngineers will be identified according to station and sampling sequence. Sample designations will be such that they can be entered into the GeoEngineers environmental data management system in order to facilitate management, recovery, and reporting of data.

- Excavation soil sample nomenclature will follow this convention: Station designation –Sample number – Depth interval
  - Station designation is “EX”.
  - Sample number is sequential in order of collection (i.e., 1 through n).
  - Depth interval is feet below ground surface (bgs).
  - For example, the third excavation limit sample collected at a depth of 11 feet below ground surface (bgs) would be labeled EX-3-11.
- Stockpile sample nomenclature will follow this convention: Station designation – Sample number
  - Overburden stockpile station designation is “SPO”.
  - Contaminated stockpile station designation is “SPC”.
  - Dangerous waste stockpile station designation is “SPD”.
  - Sample number is sequential in order of collection (i.e., 1 through n).
  - For example, the second overburden stockpile sample collected would be labeled SPO-2.
- Import material sample nomenclature will follow this convention: Source Location – Date
  - For example, proposed import material sampled from “XYZ” quarry on January 5, 2013 would be labeled XYZ-01052013.
- Surface water sample nomenclature will follow this convention: Station Designation – Date
  - The upstream sample station designation is “SWQU”.
  - The downstream sample station designation is “SWQD”.
  - For example, a water sample obtained at the downstream station on August 1, 2013 would be labeled SWQD-08012013.
- Air monitoring sample nomenclature will follow this convention: Station Designation – Date
  - The upwind sample station designation is “AIR-U”.
  - The downwind sample station designation is “AIR-D”.
  - For example, an air quality measurement collected at the downwind station on August 4, 2013 would be labeled AIR-D-08042013.
- Treated water sample nomenclature will follow this convention: Station Designation – Date
  - The influent (pre-treatment) sample station designation is “TS-IN”.
  - The primary granular activated carbon (GAC) effluent sample station designation is “TS-MID”.
  - The effluent (post-treatment) sample station designation is “TS-EF”.
  - The product sample station designation is “Product”

    - For example, a pre-treatment water sample collected from the treatment system on July 5, 2013 would be labeled TS-IN-07052013.

- Rinsate sample nomenclature will follow this convention: Designation – Sample Number – Date
    - The sample designation is "Rinsate".
    - Sample number is sequential in order of collection (i.e., 1 through n).
    - For example, a rinsate sample collected on July 5, 2013 would be labeled Rinsate-1-07052013.

- Trip blank sample nomenclature will follow this convention: Designation – Sample Number – Date
    - The sample designation is "Blank".
    - Sample number is sequential in order of collection (i.e., 1 through n).
    - For example, a rinsate sample collected on July 5, 2013 would be labeled Blank-1-07052013.

- Duplicate sample nomenclature will follow this convention: Designation – Media Designation – Sample Number
    - The sample designation is "Dup".
    - Media designation for soil/solid is "S".
    - Media designation for water/liquid is "L".
    - Sample number is sequential in order of collection (i.e., 1 through n).

3.6. Sample Preservation, Container and Hold Times

Samples for fixed laboratory analysis will be prepared, containerized, and preserved in the field in accordance with the guidelines described in Table C-4.

Samples will be kept on ice in coolers from the time of collection until delivery to the Laboratory. The samples will be preserved and hand delivered by the Field Staff, Field Coordinator, Technical Project Manager or courier to the laboratory. Alternatively, samples may be packaged and shipped to the laboratory. Samples will be kept at 0°to 6°C during delivery to the Laboratory and in refrigerated coolers while at the Laboratory until analyzed.

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents may have volatilized from the sample or degraded. Results for that analysis would be qualified as estimated to indicate that the reported results may be lower than actual Site conditions. Holding times are presented in Table C-4.

Commented [EL17]: Regarding Table 4:

VOCs in water – should list either HCL to pH < 2 and change holding time to 14 days (not 14/40); keep preservative as is but change holding time to 7 days (not 14/40).

PCB – Listed holding time is "none" which agrees with method 8082; however, the Organic Functional Guidelines (EPA 1999 and updated version 2008) have different hold time criteria for PCBs.

NWTPH-DX – Soil holding time should be 14/40.

Commented [PL18]: Table C-4 updated.

3.7. Discrepancies

In the event that changes become necessary to the field work planned in the SSSP/QAPP, the Field Staff will discuss changes with the Field Coordinator and Technical Project Manager. If, for any reason, the schedules or procedures presented in the SSSP or contained in this document cannot be followed, the field staff shall complete a Sample Alteration Form (see Attachment C-1). Changes that may significantly change the experimental design will not be implemented until they are discussed between the Technical Project Manager and the Regulatory Project Manager.

Corrective action procedures that might be implemented from QA results or detection of unacceptable data will be developed if required and documented using the Corrective Action Form (see Attachment C-2).

3.8. Sample Handling and Custody

The Field Staff will be responsible for the care and custody of the samples until they are delivered or shipped to the Laboratory. Sample labels will be placed on all sample containers and will include the following information:

- Project Name or Number
- Sample identification number (nomenclature)
- Date and time

In addition to the above, COC records will be prepared and included in each cooler of samples delivered or shipped to the Laboratory. The COC procedures will be implemented in such a way as to document sample possession from the time of sample collection until sample disposal by the Laboratory.

A sample will be considered in custody if it is:

- In the physical possession or view of the GeoEngineers staff or
- Sealed and placed in a secure location after having been in physical possession.

The COC record will contain the same information as is contained on the sample labels and serve as documentation of sample handling during delivery or shipment. One copy of this custody record will remain with the shipped samples, and one copy will be retained by the Field Staff who originally sampled and relinquished the samples. The sampler's copy will be maintained in the project file.

The samples relinquished to the Laboratory will be subject to transfer-of-custody and shipment procedures, as follows:

- The samples shipped to the Laboratory will be accompanied by a COC record documenting which samples are present in the cooler. When transferring possession of samples, the individuals relinquishing and receiving the samples will sign, date, and note the times of the sample transfer on the record. This custody record will document transfer of sample custody from the sampler to other persons, including the Laboratory.

- The samples will be properly packed for shipment and dispatched to the Laboratory for analysis, with a separate, signed COC enclosed in each sample cooler. If a GeoEngineers representative is not the person delivering the sample coolers to the Laboratory, sample shipping containers will be custody-sealed before being delivered to the Laboratory. The preferred procedure for custody sealing includes use of a custody signed seal placed across filament tape that is wrapped around the cooler at least twice. The custody seal should then be folded over and attached to itself in such a way as the package can only be accessed by cutting the filament tape or breaking the seal.
- Samples will be shipped and analyzed within the established hold times that are listed in Table C-4.

The Laboratory will utilize an established system for sample check-in, sample tracking, laboratory analyses assignment and performance, and sample check-out. The system will allow management review of the laboratory data before the issuance of laboratory reports. The management review will be accomplished on two levels: review of raw data for each analysis, and review of the final results to check for consistency or agreement of the results between parameters. Computers are routinely used for this purpose to take advantage of fast retrieval of information.

Upon receipt of samples accompanied by a COC form identifying the analytical parameters to be performed, the Laboratory Coordinator or a delegate will conduct the following:

- Log in the samples and assign Laboratory identification numbers. For each sample, a record will be generated containing the sample station number, sample description, analytical requirements, pricing information, and report format description.
- Enter these data into the Laboratory computer system.
- Prepare an analysis assignment sheet, noting the analytical parameters to be run and providing spaces for resulting analytical data.
- Assign the samples a position in the Laboratory workload backlog.
- Retain the COC form upon completion of data generation.

3.9. Analytical Methods

Laboratory analytical methods for the chemical analysis of soil and water samples collected during this investigation will include petroleum hydrocarbons, VOCs, SVOCs, PCBs as Aroclors, and metals. Samples and QC samples shall be analyzed following the analytical methods listed in Tables C-2 and C-3, using laboratory instruments prescribed in the methods. The analytical methods must meet the technical acceptance criteria specified by the method prior to the analysis of environmental samples. Samples that are not analyzed initially (i.e., placed on "hold") will be stored at the laboratory for up to 6 months, and will be disposed of by the laboratory following this period. Samples to be analyzed initially will be analyzed within proper holding times, which are listed in Table C-4.

The laboratory is required to comply with their current written standard operating procedures. Individuals responsible for corrective actions are listed in Section 2.1. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data to the laboratory project manager. A narrative describing the anomaly, the steps taken to identify and correct it, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis, re-extraction) will be submitted with the data package.

EPA Method 5035 will be used for collection of soil samples to be analyzed for VOCs in the field. Disposable plungers will be used to collect the correct amount of soil for each sample.

3.10. Quality ~~control~~Control

Quality control activities that will be implemented for each sampling, analysis or measurement technique are summarized in Table C-5. Formulas for calculating QC statistics are provided in Section 2.4.2.

The Laboratory will maintain and implement documented QA/QC procedures. The laboratory QA/QC program will provide the following:

- Procedures that must be followed for certifying the precision and accuracy of the analytical data generated by the Laboratory.
- Documentation of each phase of sample handling, data acquisition, data transfer, report preparation, and report review.
- Accurate and secure storage and retrieval of samples and data.
- Detailed instructions for performing analyses and other activities affecting the quality of analytical data generated by the Laboratory.
- Appropriate management-level review and approval of procedures, revisions to procedures, and control of procedures in such a way so that laboratory personnel that require specific procedures have access to them.

A summary of MRLs and MDLs for the Target Analytes are listed in Tables C-2 and C-3.

3.10.1. Field Quality Control

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and the potential influence of off-Site factors on project samples. Examples of off-Site factors include airborne VOCs and contaminants that may be present in potable water used during drilling activities.

3.10.1.1. FIELD DUPLICATES

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Under ideal field conditions, field duplicates, are created by thoroughly mixing a volume of the sample matrix, placing aliquots of the mixed sample in separate containers, and identifying one of the aliquots as the primary sample and the other as the duplicate sample. Field duplicates measure the precision and consistency of laboratory analytical procedures and methods, as well as the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected for every ten soil verification samples. For groundwater, one field duplicate will be collected for every ten samples collected or a minimum of one per sampling event. Field duplicates will not be collected for pre- and post-use soil characterization, soil stockpile, import material, or water treatment samples.

3.10.1.2. EQUIPMENT RINSATE BLANKS

Equipment rinsate blanks will be used to evaluate the effectiveness of decontamination procedures for preventing possible cross-contamination of project samples. Rinsate samples will be collected by slowly pouring distilled water over decontaminated sampling equipment and collecting the rinse water in appropriate sample containers for analysis.

A minimum of one equipment rinsate blank will be collected for every day of soil or groundwater sampling if reusable equipment are used for sampling. At least one equipment rinsate blank will be collected for every 10 samples collected.

3.10.1.3. TRIP BLANKS

Trip blanks consist of samples of reagent water that accompany samples to be analyzed for VOCs during sample storage in coolers and transport to the laboratory. They are used to assess potential contamination of samples during collection and transport due to the presence of VOCs in ambient air.

Trip blanks will be analyzed on a one per cooler basis containing samples for VOC analysis.

3.10.2. Laboratory Quality Control

Laboratory QC procedures will be evaluated through a formal data quality assessment process. The analytical laboratory will follow standard analytical method procedures that include specified QC monitoring requirements. These requirements will vary by method, but generally include:

- Method blanks
- Internal standards
- Instrument calibrations
- Matrix spike/matrix spike duplicates (MS/MSD)
- Laboratory control samples/laboratory control sample duplicates (LC S/LCSD)
- Laboratory replicates or duplicates
- Surrogate spikes

3.10.2.1. LABORATORY BLANKS

Laboratory procedures utilize several types of blanks, but the most commonly used blanks for QC monitoring are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process, or reagent (contaminant-free) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatiles analysis since VOCs can be transported in the laboratory through the vapor phase. If a substance is detected in a method blank, then one (or more) of the following occurred:

- Sample containers, measurement equipment, and/or analytical instruments were not properly cleaned and contained contaminants.

- Reagents used in the process were contaminated with a substance(s) of interest.
- Volatile substances in ambient laboratory air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. If target analytes are detected in method blanks, data validation guidelines assist in determining which substances in project samples are considered "real," and which ones are attributable to the analytical process. Furthermore, the guidelines state, ". . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example."

3.10.2.2. CALIBRATIONS

Several types of instrument calibrations are used, depending on the analytical method, to assess the linearity of the calibration curve and assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations, and continuing calibration verification.

3.10.2.3. MATRIX SPIKE/MATRIX SPIKE DUPLICATES (MS/MSD)

MS/MSD samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH can affect the results for semi-volatile organic compounds. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix effects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a project sample with a known amount of one or more of the target analytes, ideally at a concentration that is 5 to 10 times higher than the sample result. A percent recovery is then calculated by subtracting the un-spiked sample result from the spiked sample result, dividing by the known concentration of the spike, and multiplying by 100.

MS/MSD samples will be analyzed at a frequency of one MS/MSD per sample set or batch. The samples for the MS/MSD analyses should be collected from a boring or sampling location that is believed to have only low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for the MS/MSD analyses as required by the laboratory.

3.10.2.4. LABORATORY CONTROL SAMPLE/ LABORATORY CONTROL SAMPLE DUPLICATES (LCS/LCSD)

Also known as blanks spikes, laboratory control samples (LCS) are similar to MS samples in that a known amount of one or more of the target analytes are spiked into a prepared sample medium, and a percent recovery of the spiked substances is calculated. The primary difference between LCS and MS samples is that the LCS uses a contaminant-free sample medium. For example, reagent water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance.

3.10.2.5. LABORATORY REPLICATES/DUPLICATES

Laboratories utilize MS/MSDs, LCS/LCSDs, and/or replicates to assess precision. Replicates are a second analysis of a field-collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process; they most commonly consist of a second analysis on the extracted media.

3.10.2.6. SURROGATE SPIKES

Surrogate spikes are used to verify proper extraction procedures and the accuracy of the analytical instrument. Surrogates are substances with characteristics similar to the target analytes. A known concentration of surrogate is added to the project sample and passed through the instrument, and percent recovery is calculated. Each surrogate used has acceptance limits (i.e., an acceptable range) for percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified acceptance limits, a possibility of false positives exist, although non-detect results are considered accurate.

3.11. Instrument/Equipment Testing, Inspection, and Maintenance

3.11.1. Field Instrumentation

Field instrumentation used during this project includes a water quality meter, air particulate meter, and PID. The field equipment is maintained as needed by an outside servicer qualified to maintain such devices consistent with manufacturer's specifications.

Field instrument calibration and calibration checks facilitate accurate and reliable field measurements. The calibration of the field equipment used on the project will be checked and adjusted as necessary in general accordance with the manufacturer's recommendations. Methods and intervals of calibration checks and instrument maintenance will be based on stability characteristics, required accuracy, intended use, and environmental conditions. The basic calibration check frequencies are described below.

The particulate meter used for air monitoring will be calibrated by a qualified serviceman on an annual basis. In the event the meter may not be working correctly, a separate meter will be shipped to the field team and the non-working meter will not be used.

The water quality meter used for surface water monitoring (i.e., pH, electric conductivity, and turbidity) will be calibrated on a weekly basis in accordance with the manufactures recommendations. Calibration check and calibration results will be recorded in the field notebook. In the event that the instrument does not calibrate properly, spare parts will be available for minor field maintenance. If the instrument cannot be made to work based on available equipment, a separate instrument will be shipped to the field team and the non-calibrating instrument will not be used.

The PID used for headspace vapor screening will be calibrated to 100 ppm isobutylene in general accordance with the manufacturer's recommendations. Calibration check and calibration results will be recorded in the field notebook. In the event that the instrument does not calibrate properly, spare parts will be available with the PID for minor field maintenance. If the instrument cannot be made to work based on available equipment, a separate instrument will be shipped to the field team and the non-calibrating instrument will not be used.

All equipment is visually inspected before use by the Field Staff to ensure it is clean and in good working condition. Inspection includes visual inspection of the outside of the equipment, and battery checks.

3.11.2. Laboratory Instrumentation

For chemical analytical testing, calibration procedures will be performed in general accordance with the analytical methods used and the laboratory's standard operating procedures (SOPs). Calibration documentation will be retained at the laboratory.

Instruments and equipment used during laboratory sample analysis will be operated, calibrated and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology and/or in accordance with the laboratory's QA manual and SOPs.

3.12. Instrument/Equipment Calibration and Frequency

All laboratory instrument calibrations and their appropriate chemical standards are to comply with the specific methods within EPA SW-846, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods, 3rd Edition, December 1996 and the Laboratory SOPs. Calibration documentation, initial (ICALs) and continuing (CCALs), will be retained at the Laboratory. Deficiencies to be resolved are the responsibility of the Laboratory Project Manager.

3.13. Inspection/Acceptance of Supplies and Consumables

The Field Coordinator is responsible for ensuring that field supplies and consumables are available on Site. Field equipment and consumables generally originate from the supply room, which is re-stocked by suppliers as necessary. Laboratory containers are supplied by the laboratory. The Field Coordinator will track, retrieve and inspect these materials.

Laboratory reagents will be of sufficient quality to minimize or eliminate laboratory blank background concentrations of the specific analytes to be measured. Reagents must also not contain other contaminants that may interfere with the analysis for the analytes of interest. All sample containers will be provided by the laboratory. All containers will be certified clean, verified with laboratory analysis. The Laboratory Project Manager is responsible for maintaining laboratory supplies.

3.14. Non-Direct Measurements

A substantial quantity of data has previously been collected at the Site. The previously collected data will be used in conjunction with the data collected during this removal action to delineate the nature and extent of contamination on the western portion of the Site. The previously collected data that will be used include observations present on investigation logs as well as chemical analytical data that have previously been reported in the draft and draft final EE/CA prepared for the Site (E&E, 2010). As the data has previously been utilized for Site characterization as presented in the EE/CA, it is considered of adequate quality for the purposes of this removal action.

3.15. Data Management

The data generated by the Laboratory will be managed in accordance with the procedures outlined in this QAPP and applicable Laboratory operating procedures. The Laboratory Project Manager is responsible for laboratory record-keeping, document control, and delivery of reliable and accurate data. Data management procedures are described below.

3.15.1. Data Collection

In addition to the sampling data recorded on the chain-of-custody forms, data describing the processing of samples will be accumulated in the Laboratory and recorded in Laboratory notebooks. Laboratory notebooks will contain the following information:

- Date of sample processing.
- Laboratory sample numbers.
- Analyses or operations performed for the samples.
- Calibration data applicable to the sample analysis.
- Quality control samples applicable to the sample analysis.
- Concentrations and required dilutions for the analysis.
- Instrument readings.
- Any special observations.
- The analyst's signature.

3.15.2. Data Reduction

Data reduction consists of calculating concentrations in samples from the raw data produced by the measuring instruments, and it will be performed by individual analysts assigned to the project. The complexity of the data reduction is dependent on specific analytical methods and the number of discrete operations (extractions, dilutions, and concentrations) involved in obtaining a sample concentration that can be measured.

For methods relying on a calibration curve, sample responses will be applied to the linear regression line to obtain an initial raw result that will be factored into method-specific equations to obtain an estimate of analyte concentrations in the original sample. Rounding will not be performed until after the final result is obtained to minimize rounding errors, and results will not normally be expressed in more than two (2) significant figures.

Upon completion of a set of analyses, calculations will be completed and checked by the analyst. The associated QC data derived from the analysis of method blanks, blank spikes, and duplicates will be entered onto QC charts and verified to be within control limits. If they are acceptable, the data will be entered into the laboratory computer system and data summaries (notebook pages, final concentrations) will be submitted to the Laboratory Project Manager for review. After approval, data are manually entered into a computer, using a Microsoft Excel® or equivalent format. If QC samples do not meet acceptance criteria, the Laboratory Project Manager will be notified and corrective actions will be taken, as appropriate. Acceptable data will be submitted to the Laboratory Project Manager for review. After the Laboratory Project Manager approval, the Data Management Coordinator will be notified that the data are ready to be reported, and the completed analyses can be removed from the laboratory backlog.

The Laboratory Project Manager will generate a hard copy data summary that will be reviewed and signed by the Laboratory Project Manager and the Laboratory Coordinator.

Copies of the raw data and the calculations used to generate the final results will be retained on file to allow reconstruction of the data reduction process at a later date, if necessary.

3.15.3. Data Review

System reviews will be performed at all levels. The individual analysts will review the quality of data through calibration checks, quality control sample results, and performance evaluation samples.

The final routine review is performed by the Laboratory Project Manager prior to reporting the results to the client. Non-routine audits are performed by regulatory agencies and client representatives. The level of detail and the areas of concern during these reviews will be dependent on the specific program requirements.

3.15.4. Data Reporting

Laboratory reports will contain final analytical results (uncorrected for blank contamination and out-of-control recoveries), identification of the analytical methods used, levels of detection, surrogate and matrix spike recovery data, and method blank data. In addition, special analytical problems and/or any modifications of the referenced methods will be noted. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method.

Data are normally reported in units commonly used for the analyses performed. Concentrations in solids are expressed in terms of weight per unit weight, milligrams per kilogram or liter (ppm for inorganics) or micrograms per kilogram or liter (ppb for organics).

- mg/kg = ppm
- mg/L = ppm
- µg/kg = ppb
- µg/L = ppb

Illustrated unit conversions are as follows:

- 1 mg/kg = 1000 µg/kg
- 1 mg/L = 1000 µg/L

- 1 µg/kg = 0.001 mg/kg
- 1 µg/L = 0.001 mg/L

3.15.5. Electronic Deliverables

Upon completion of analyses, the Laboratory shall prepare electronic deliverables for all packages in accordance with the specifications in this QAPP. The Laboratory shall provide electronic deliverables no later than five business days after receipt of final analytical results. Final analytical results will be provided by the Laboratory within 10 days of the sample analysis.

The Electronic Data Deliverable (EDD) should follow the EQuIS Chemistry 4-file format. Specific details regarding data types, valid values, and field definitions are referenced in the Lab Specification. A template of the EQuIS 4-file format (provided upon request) includes a list of valid values and must be obtained in order to ensure the correct use of codes. The template spreadsheet contains four tabs, each with a format for importing various data into different parts of the EQuIS Chemistry data structure and four tabs containing valid values. Ultimately, the EDDs provided by the Laboratory must be delivered as text (.txt), comma-delimited (.csv), or Excel files.

Electronic files will be delivered via e-mail with a supporting hard copy to GeoEngineers. Electronic files will be reviewed by GeoEngineers to determine if the specifications in this section have been followed. If a file format or structure does not meet specifications, GeoEngineers may request a complete re-submittal. Upon reviewing the electronic file, GeoEngineers may also require a re-submittal based on inconsistencies (hereafter referred to as an "error") in code, spelling or missing information.

Each EDD package (a package being a sample delivery group [SDG]) may be delivered as separate files or as a single Excel workbook. Both methods require four file types: one type for samples, one for tests, one for results, and one for batches. If the separate file method is used, the following nomenclature must be followed in the file name - [SDG]_EFW2Lab[type].[extension] where:

- SDG = sample delivery group (i.e. lab package ID)
- Type = one of the following: SMP for sample data, TST for test data, RES for result data, BCH for batch data
- Extension = the file extension (e.g. .xls, .csv, .txt)

For example, for sample delivery group K1234 the files would be: K1234_EFW2LabSMP.xls, K1234_EFW2LabTST.xls, K1234_EFW2LabRES.xls, and K1234_EFW2LabBCH.xls.

The Laboratory will maintain on file all of the raw data, laboratory notebooks, and other documentation pertinent to the work on the project. This file will be maintained for a period of five years from the date of the project, unless a written request is received for an extended retention time.

3.15.6. Data Archival and Retrieval

The Laboratory will utilize an established system for data archival and retrieval. Computers are routinely used for this purpose to take advantage of fast retrieval of information. Data will be stored in-office and off site in a backup location. Hardware and software will be suitable to the secure archival and retrieval of information.

4.0 ASSESSMENT AND OVERSIGHT

4.1. Assessments and Response Actions

Quality assurance assessments will be conducted during the course of this project. The quality assurance assessment performed during this project may include the following:

- Review of Field Documentation and Laboratory Receipt Information
- Response Actions for Field Sampling
- Corrective Action for Laboratory Analyses

QA assessments will be conducted by the Quality Assurance Leader and/or Field Coordinator. Corrective action procedures that might be implemented from QA results or detection of unacceptable data will be developed if required and documented using the Corrective Action Form (see Attachment C-2). If, for any reason, the schedules or procedures presented in the SSSP or above cannot be followed, the field staff shall complete a Sample Alteration Form (see Attachment C-1). The Sample Alteration Form will be reviewed by the Quality Assurance Leader and Technical Project Manager. Example Correction Action and Sample Plan Alteration Forms are presented in Attachments C-1 and C-2, respectively.

4.1.1. Review of Field Documentation and Laboratory Receipt Information

~~Documentation of f~~Field sampling data documented in the daily field reports will be reviewed ~~daily or~~ within five days by the Field Coordinator or Technical Project Manager for conformance with project QC requirements described in this QAPP. Minor corrective actions will be addressed by the Field Coordinator or Technical Project Manager. Major discrepancies will be reported to the Regulatory Project Manager by the Technical Project Manager, who has the authority to issue stop work orders. Major discrepancies will be documented in the final report, along with the reason for the discrepancies and any corrective actions. At a minimum, ~~the Technical Project Manager will check~~ field documentation will be checked for the following:

- Sample collection information (date, time, location, matrices, etc.);
- Field instruments used and calibration data;
- Sample collection protocol;
- Sample containers, preservation, and volume;
- Field QC samples collected at the frequency specified;
- COC protocols; and
- Sample shipment information.

Commented [EL19]: Include a "sample plan alteration form" that addresses field changes to the SSSP that do not meet the need for a corrective action form.

Commented [PL20]: See additional text.

Commented [EL21]: Describe how the daily field report fits into the review of field documentation.

Commented [PL22]: See revised text.

Sample receipt forms provided by the laboratory will be reviewed by the Technical Project Manager or Quality Assurance Leader for QC exceptions. The final laboratory data package will describe (in the case narrative) the effects that any identified QC exceptions have on data quality. The laboratory will review transcribed sample collection and receipt information for correctness prior to delivering the final data package.

4.1.2. Response Actions for Field Sampling

The Field Staff, or a designee, will be responsible for correcting equipment malfunctions or requesting new equipment throughout the field sampling effort and resolving situations in the field that may result in nonconformance or noncompliance with the QAPP. Corrective measures will be documented in the field notebook. Any deviations from the SSSP or QAPP will be documented on a Sample Plan Alteration Form (see Attachment C-1) which will provide a description of and rational for the deviation.

4.1.3. Corrective Action for Laboratory Analyses

The Laboratory is required to comply with their current written standard operating procedures. The Laboratory Project Manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data to the Laboratory Project Manager. A narrative describing the anomaly, the steps taken to identify and correct it, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis, re-extraction) will be submitted with the data package.

Corrective action procedures implemented from QA results or detection of unacceptable data will be documented using a Corrective Action Form (see Attachment C-2).

4.2. Reports to Management

The field work including construction monitoring, soil, water and air sampling for the removal action is expected to be performed over an estimated 16 week period. As discussed in section 3.4, field activities including construction, sampling, and monitoring activities, Site personnel and weather conditions, as well as decisions, corrective actions, and/or modifications to the project plans and procedures will be documented by the Field Staff on a daily basis throughout the removal action.

Progress reports summarizing field activities performed to date, major findings and anticipated future tasks will be prepared by ~~T~~The Technical Project Manager will ~~will~~ provide status reports to the Regulatory Project Manager on a weekly basis as described in Section 11.1 of the Work Plan. ~~(i.e., progress reporting).~~ In addition, ~~Additionally,~~ analytical data will be transmitted to the Regulatory Project Manager within seven days following validation or as otherwise agreed with EPA. ~~Status reports will include a brief discussion of activities performed to date, major findings and anticipated future tasks.~~

Commented [EL23]: Clarify how the daily report described above will be included as part of this report and whether this report is the same as the weekly report described at Section 11.1 of the project Work Plan.

Commented [PL24]: See revised text.

5.0 DATA VALIDATION AND USABILITY

5.1. Data Review, Verification and Validation

The data validation and usability elements of the QAPP as detailed below address the QA/QC activities that occur after data collection and/or data generation is complete. Implementation of these elements ensures that the data conform to the specified criteria and will achieve the project objectives. Data validation will be performed in general accordance with the two EPA documents, USEPA Contract Laboratory Program National Functional Guidelines for *Organic* and *Inorganic* Data Review (EPA, 1999 and 2004).

The data are not considered final until validated. All data, including laboratory and field QC sample results, will be summarized in a data validation report. Specific acceptance criteria are discussed in Section 2.4.2. The data validation report will focus on data that did not meet the MQOs specified in Table C-1. The data validation report will also describe any deviations from this QAPP and actions taken to address those deviations.

Full laboratory data packages will be obtained for all soil samples analyzed. These data packages will include all formal Contract Laboratory Program (CLP) summary forms, and they will also include all instrument raw data from the chemical analyses. GeoEngineers will conduct an EPA Stage “2B” level validation on all data packages. In addition, GeoEngineers will conduct EPA Stage “4” level validation on ten percent (10%) of the data packages. These data will be reviewed for the following QC parameters:

- Holding times and sample preservation
- Method blanks
- MS/MSD analyses
- LCS/LCSD analyses
- Surrogate spikes
- Duplicates/replicates
- Field/Lab duplicates
- Calibrations (Initial and Continuing)
- Internal Standards
- Instrument Tunes

In addition to these QC parameters, other documentation such as sample receipt forms and case narratives will be reviewed to evaluate laboratory QA/QC.

5.2. Verification and Validation Methods

The Quality Assurance Leader will verify and validate data received from the laboratory. Any issues will be discussed with the Laboratory Project Manager and/or the Technical Project Manager, if needed. Issues will be resolved by these individuals. The final data validation report will document the results of any issue resolution process.

Hard-copy laboratory reports will provide the analysis-specific information including final sample analytical results, reportable field and laboratory QA/QC analytical results, MDLs and MRLs. The laboratory data will also be reported via electronic media using the tabular outputting capabilities of standard software formats.

The term "reporting limit" will be used interchangeably with "quantitation limit" to mean the lowest concentration at which an analyte can be quantified subject to the quality control criteria of the analytical method. These terms are different from "MDL," which refers to the lowest concentration that the analytical method can ideally detect.

The Quality Assurance Leader will be responsible for overseeing data validation qualifiers including but not limited to "U," "J,", and "R" to explain final data quality issues that are affecting the laboratory data for the data user. The validation process will take any specific laboratory qualifiers, and any other laboratory quality control issues into consideration when applying and creating this final set of usable qualifiers, as described in the EPA document "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use" (EPA, 2009). The qualifiers U, J and R are explained as follows:

- "U" indicates that a compound was analyzed for but not detected. The associated numerical value is the estimated sample quantitation limit, which is corrected for dilution and percent moisture.
- "J" indicates that a compound was detected below the reporting limit and the value is estimated or the value was estimated by the validator because of instrument bias reasons.
- If any target analytes are found in a laboratory method blank, it will be regarded as blank contamination. In these cases, the result of a given analyte in the method blank will be compared to any positive result of the same analyte in the associated field samples. If a field sample result is less than five times (ten times for common laboratory contaminants like acetone, phthalates, etc.) the result that is reported in the method blank, the result will be considered blank contamination. Accordingly, the result will be qualified as not-detected "U" at the elevated reporting limit.
- If there are two analyses reported by the laboratory for one sample (as in the case of dilutions), the validator will make a decision as to which analysis to use in the final assessment. As there should be only one reported result per analyte for a given sample, any extraneous results will be qualified as not-reportable "R" and will not be used.

5.3. Reconciliation With User Requirements

A data validation report will be produced by the project Quality Assurance Leader to identify cases where the projects MQOs were not met. The data validation report will include a discussion of the uncertainty and limitations of the data.

6.0 LIMITATIONS

We have prepared this Removal Action Work Plan for use by the Potlatch during the removal action at the Avery Landing Site. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions express or implied should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

~~6.0~~7.0 REFERENCES

Ecology and Environment (E&E). "Draft Final Engineering Evaluation/Cost Analysis, Avery Landing Site, Avery Idaho." Prepared for EPA by E&E, dated December 2010.

GeoEngineers, Inc., "Supplemental Site Investigation Report, Avery Landing Site, Avery, Idaho." Prepared for Potlatch Forest Holdings, Inc., GEI File No. 2315-016-01, dated November 9, 2011.

Golder Associates. "Draft Engineering Evaluation/Cost Analysis Work Plan, Avery Landing Site, Avery Idaho." Prepared for Potlatch Land and Lumber, LLC by Golder Associates, dated January 23, 2009.

U.S. Environmental Protection Agency (USEPA). "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," EPA-540/R-99/008, Office of Emergency and Remedial Response. US Environmental Protection Agency, Washington, DC, dated October 2008~~1999~~.

U.S. Environmental Protection Agency (USEPA). "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5," EPA-240/B-01/003, Office of Emergency and Remedial Response. US Environmental Protection Agency, Washington, DC, dated March 2001.

U.S. Environmental Protection Agency (USEPA). "EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5", EPA-240/R-02/009, Office of Emergency and Remedial Response. US Environmental Protection Agency, Washington, DC, dated December 2002.

U.S. Environmental Protection Agency (USEPA). "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," EPA 540-R-04-004, Office of Emergency and Remedial Response. US Environmental Protection Agency, Washington, DC, dated October 2010~~04~~.

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA 540-R-08-005, Office of Solid Waste and Emergency Response. US Environmental Protection Agency, Washington, DC, dated January 2009.

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